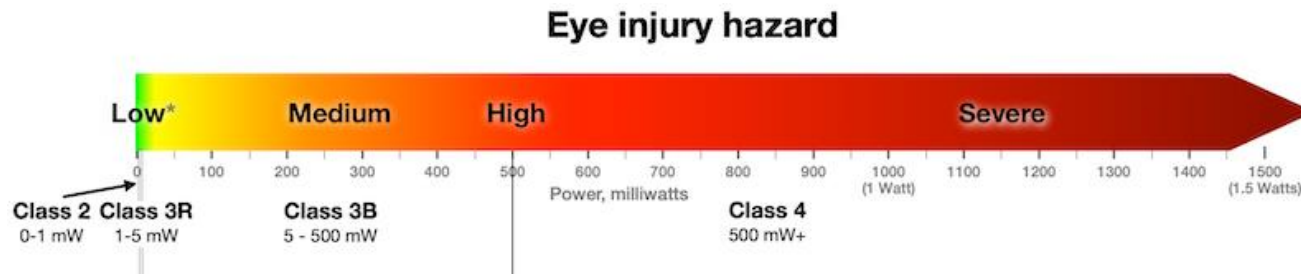


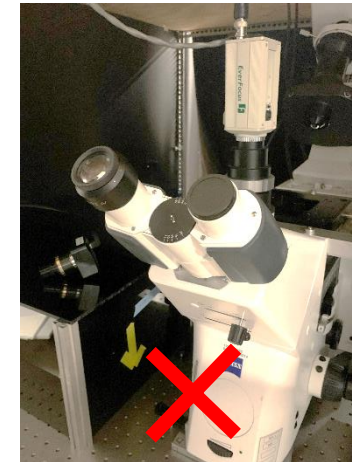


Lasers and Eyepieces – A safety hazard:

- Microscopes with low power light sources often use eye pieces to observe samples.
- But, when laser light sources are present on microscopes, eye pieces can quickly become a hazard.
- Even low laser classes can lead to injury when viewed through optical instruments.
- To prevent accidents and maintain the ability to observe samples, commercial C-mount microscope cameras are a great option:



ANSI and IEC laser classification	Class 1		Class 2		Class 3		Class 4
	Class 1	Class 1M	Class 2	Class 2M	Class 3R	Class 3B	Class 4
Sub-class	Class I	No special FDA class	Class II	No special FDA class	Class IIIa	Class IIIb	Class IV
U.S. FDA laser classification	Class I	No special FDA class	Class II	No special FDA class	Class IIIa (definition is different but results are similar)	Class IIIb	Class IV
EYE AND SKIN HAZARDS							
Eye hazard for intraocular exposure (having a direct or reflected beam enter the eye)	Safe, even for long-term intentional viewing. For visible light, usually applies when the laser is enclosed inside a device (ex: CD or DVD player) with no human access to laser light.	Safe for unaided eye exposure. May be hazardous if viewed with optical instruments such as binoculars or eye loupe.	Safe for unintentional exposure less than 1/4 second. Do not stare into beam.	Safe for unintentional (< 1/4 sec) unaided eye exposure. May be hazardous if viewed with optical instruments such as binoculars or eye loupe.	Unintentional or accidental exposure to direct or reflected beam has a low risk. Avoid intentional exposure to direct or reflected beam.	Eye hazard; avoid exposure to direct or reflected beam.	Severe eye hazard; avoid exposure to direct or reflected beam.



- Further Advantage: Images and videos of the sample are acquired easily.
- Disadvantage: Small dynamic ranges or long exposure times can make frequent operations such as focusing difficult.
- A good model now used in our lab can be found here: <https://amscope.com/products/mu313-bi-ck>

Information valid for visible light lasers (400 – 700 nm).
 Figure and table adapted from: <https://www.lasersafetyfacts.com>.